

Publishable Executive Summary – Goals and results from EURRECA's third year

The approach by which reference values for micronutrients are derived, as well as the reference values themselves, vary considerably across countries. Harmonisation is needed to align nutrition policy and public health strategies. In the context of the harmonisation exercise the *EUROpean micronutrients RECommendations Aligned* (EURRECA) - EC Network of Excellence has been established to identify and develop methodologies to standardise the process of setting micronutrient recommendations. EURRECA has finished its third year of activities which can be described as the year of transition. In 2009 the Research Activity 1 – defining best practices – was finalised, Research Activity 2 – different population groups – went full speed ahead and the first steps of Research Activity 3 – requirements of micronutrients of concern – have been taken. In the meantime the integrating activities proved their added value for the process of harmonisation and setting methodologies. This concise summary reflects some of the major achievements of the EURRECA Network of Excellence in 2009.

In 2009, the inventory of best practice methodologies relevant to deriving requirements and setting recommendations in a scientific framework (Research Activities 1) was finalised.

Best practice definitions

The Research Activity on Intake methods (RA1.1) aims to critically evaluate different methodologies to assess dietary intake. The results of this Research Activity are compiled and published in two supplements of the *British Journal of Nutrition* (June 2009 and early 2010). The two supplements are based on systematic reviews and cover the following topics:

1. best methods for estimating intake of specified micronutrients, taking into account biomarkers for intake validation;
2. methodology used for assessing nutrient adequacy including diet patterns, as well as those most commonly used in Europe;
3. description of measurement error sources and their magnitude;
4. how diet assessment instruments are adapted to best capture information in immigrant and low income populations;
5. use of new technologies for diet assessment.

The Research Activity on Status methods (RA1.2) aims at critically evaluating biomarkers of micronutrient status and disseminating the findings in formats accessible to a range of European stakeholders. Findings of the different systematic reviews were published in the *American Journal of*

Clinical Nutrition (June 2009). The supplement includes reviews on the following nutrients: selenium, zinc, riboflavin, vitamin B12, copper, poly-unsaturated fatty acids and vitamin D. This supplement combined with an earlier EURRECA Supplement (*British Journal of Nutrition*, June 2008) partially formed the basis of the newly developed best practice guidelines describing biomarkers of micronutrient status. The documents describe the available measures of status and exposure, plus the advantages and limitations of each, for twenty key micronutrients. In addition, documents summarising of cut-off values for key markers of status of the EURRECA priority micronutrients have also been developed. The prioritised micronutrients are: zinc, folate, vitamin B12, iron and iodine. The prioritisation process was based on i) new evidence; ii) public health relevance; iii) heterogeneity in Europe.

Different population groups

The Research Activity 2 (RA2) focuses on specific population groups. RA2 – on full speed in 2009 – is systematically reviewing the literature on observational and intervention studies, in order to address the relationship between dietary intake and nutritional status, nutritional status and health, and dietary intake and health for prioritised micronutrient-health outcome combinations for all age/life stage population groups. Health outcomes considered include (depending on the population group): growth, neurodevelopment, immune response to vaccination, folate-deficiency anemia, megaloblastic anemia,

nervous system disease, osteoporosis, immune function, dermatitis, psychomotor development, cancer, endemic goiter, hypothyroidism, cretinism and cognitive function. Population groups cover: infants (RA2.1), children and adolescents (RA2.2), adults (RA2.3), elderly (RA2.6) and pregnant & lactating women (RA2.4).

The methodology used for this systematic literature review process is a step-wise approach and is presented below:

1. The databases EMBASE, Medline and Cochrane were searched using a standardized search strategy including keywords on intake measures, status markers and study designs. Only human intervention (e.g. Randomised Clinical Trials) and observational studies (prospective cohort and cross-sectional) were considered.
2. All titles and abstracts were sorted and screened for relevance.
3. Papers were selected on the basis of predefined inclusion and exclusion criteria using in/out forms. The criteria used included study design, method of dietary assessment (RA1.1 guidance), status markers (RA1.2 guidance) and health.
4. In the final selection of relevant papers data were extracted and entered in an Access database and the outcomes will be used to inform and develop the meta-analyses for Research Activity 3.

In addition to the standardised systematic literature review methodology, the different population groups had specific objectives. Research Activity on **infants** (2.1) reviewed the latest evidence available on the nutrient intake of European infants from breast milk and infant formulae. For data on breast milk intake or composition, a strategy was defined to search on MEDLINE. For the data on intake from formula, different databases were searched using a different strategy. Information on the real content of different infant formulae marketed in Europe has been collected to compare with the data found in the literature. Both searches were extended to macro and micronutrients. Research Activity on **pregnant and lactating women** (2.4) has elaborated more detailed work on physiological characteristics and critical factors relevant to nutrient needs of pregnant women. The results

have been published in a paper in *Human reproduction update* (September 2009). Research Activity on **adults** (2.3) has conducted an 'in-depth' systematic review to assess the global impact of selenium on health outcomes (global index). Data on the relationship between cancer and selenium intake and status will be provided by the World Cancer Research Fund (WCRF). Research Activity on **low income & immigrants** (2.7) mainly works on the assessment of nutrient inadequacy (via intake and status). In the context of these activities a web-based tool for nutritional adequacy data collection and assessment was developed and used to extract studies.

Research Activity on population groups (RA2) will continue in 2010. Its results will now form the backbone of the Research Activity on requirements of micronutrients of concern (RA3).

Requirements of micronutrients of concern

This Research Activity 3 (RA3) focuses on requirements of micronutrients of concern. RA2 extends and further aligns the activities and deliverables progressed during the RA1 and RA2. Meta-analysis of data extracted in Research Activity 2 will be conducted according to the work of the Research Activity on intake-status relationships (RA3.1), the Research Activity on classical nutrition studies (RA3.2), the Research Activity on bioavailability (RA3.3) and the Research Activity on risk of inadequate intake (RA3.5). The literature databases created in Research Activity 2 will be used, in conjunction with new searches, to perform systematic reviews about the effects of bioavailability on absorption and metabolism, and also the influence of polymorphisms. The latter part of this work will be partly conducted in collaboration with Integrating Activity 3, on influences of individuality, variability and vulnerability (e.g. metabolomics, phenotype).

In June 2009, the Research Activity on the issues of bioavailability and individuality (RA3.3) held a bioavailability workshop during which invited experts presented relevant issues for a number of key micronutrients. Participants were also asked to

take part in discussion sessions. The results of these discussions, collated with the invited experts' manuscripts, have recently been submitted to the *American Journal of Clinical Nutrition* as a supplement due for publication in early 2010.

The different Research Activities are all linked with the Integrating Activities – described hereunder – and provide added value to the EURRECA Network of Excellence.

Consumer understanding and stakeholder interaction

The key objectives of the Integrating Activity on consumer understanding and stakeholder interaction (IA1) consist in (i) integrating consumer and stakeholder issues and (ii) providing guidelines about consumer and stakeholder considerations in the process of the developing micronutrient recommendations. In the scope of 2009, this Integrating Activity 1 achieved the following topics:

1. Identification of key criteria for assessing the impact, utility and nature of consumer and stakeholder involvement in the process of setting nutrition policy. Publication under review for submission to *Food Policy*.
2. Development of theoretical guidance on the rationale and processes of decision-making in setting micronutrient recommendations and the related policy. The findings to date indicate that in Europe, varied bodies are responsible for setting micronutrient recommendations, each with different statutory models of operation and a range of influences (not just scientific) upon the final decisions about the policy approaches to nutrition-related public health. There is however a large variation across Europe in the degree to which these influences in the decisions (e.g. stakeholder involvement) are formalized. These findings will form different papers (under review) and be published in the *European Journal of Clinical Nutrition* and *Public Health Nutrition*.
3. Comparison across Europe of the decision-making processes of nutrition-related scientific advisory bodies. Here again, results show that various bodies are

responsible, each with different statutory and legal models of operation leading to an ad hoc selection of problem areas to consider, such as lack of openness and transparency of the decisions and overreliance upon international recommendations. The development of the EURRECA General Framework (to be published early 2010 in *European Journal of Clinical Nutrition*) is a first step towards the formalisation, as it articulates the processes of setting micronutrient recommendations from science to policy, taking account of the wider social context (including stakeholder and consumer involvement).

4. Review of consumer awareness, understanding and use of national food based dietary guidelines. The evidence was found to be limited and will form the basis of a peer-reviewed article.
5. Development of a framework for evidence-based policy by reviewing theories/models and a case study in the UK on tracking micronutrient-relevant behaviours and behaviour changes. This framework includes health outcome, policy instrument, behaviour, policy & institutional context and the wider context (socio-cultural and economic). Four reports are being reviewed by the IA1 partners.

Opportunities for SMEs

In 2009, the Integrating Activity on opportunities for SMEs (IA2) continued towards achieving its main goal, namely making use of the results of EURRECA to benefit Small and Medium Enterprises (SMEs) within and beyond the network. Therefore a user-friendly software tool (Nutri-RecQuest) consisting in an interactive database with current micronutrient recommendations of all European countries has been developed. This web-based tool was built up in close collaboration with Research Activities 1.4. The second tool (NutPlan) is a dietary software tool for implementing micronutrient recommendations. It builds on the previous database to meet the needs of SMEs and others in European countries that lack dietary software. It includes multiple functions such as individual and group nutrition planning, recipe

calculation, diet planning, creating food labels and nutrient intake assessment.

A survey on the SMEs' use of micronutrient recommendations was completed, and data are being analyzed. The resulting report will be instrumental in facilitating better use of micronutrient recommendations by SMEs, through an accessible code of practice. Comparison of 9 business models in the field of personalized nutrition, based on nutrigenetics or metabolomics may help SMEs to start planning future scenarios as the science underlying personalized nutrition evolves. The business models are differentiated by type: service to consumer without product, product-linked or network-based. A round table discussion on "Personalized Dietary Advice and Nutrition: Perspectives for SMEs" produced a report with new insights on how the market of personalised nutrition may evolve especially in reference to micronutrients. The results brought some unexpected conclusions: for example, concerning the role of the food industry, personalized nutrition may be more about delivering services than food products. Moreover, a metabolomic topic on the EURRECA SME forum has been opened. This round table discussion was held in close collaboration with Integrating Activity 3.

In order to reach the goal of implementing a framework for actually developing or promoting foods, the contribution of traditional foods to micronutrient intake in the Mediterranean area has been investigated (results published in *Mediterranean Journal of Nutrition & Metabolism, September 2009*), and traditional foods that may bear claims have been identified. Furthermore, the framework is tested in a food producing Greek SME. Further steps to identify food producing partners are necessary. The use of a wiki-website (www.eurrecawiki.org) including an inventory of nutrition software programmes has commenced. The wiki page which aims to facilitate improvements of dietary software received good response from software producers. Further a factsheet helping Europe's SMEs to ensure that their lab testing for micronutrients is adequate has been produced.

Influences of individuality, variability and vulnerability

The Integrating Activity on influences of individuality, variability and vulnerability (IA3) has developed a series of tools to identify personalized requirements for micronutrients. These are

1. Information sources on micronutrient specific biological function, catabolism, diseases related to nutrition, markers of homeostasis and / or health, determinants of status, as a basis for identification of personalized aspects (<http://wiki.nugo.org/index.php/Category:Micro nutrients>), in collaboration with the European Nutri-genomics Organization.
2. Analytical technologies (metabolomics) to quantify plasma parameters that report on the relationship between micronutrients and their biological activity.
3. Mathematical models that will integrate the information and analysis on a personal level, to predict personal micronutrient requirements. The models will also include genetic variation, in collaboration with RA3.

Training

EURRECA finalized in the course of 2009 the first interactive digital learning material. The aim of this first e-learning module is to gain insight into the principles of evaluation studies within nutritional research.

Future

During the last two years of the EURRECA Network of Excellence the research activities will align the evidence on requirements for the selected priority micronutrients by adding expert knowledge to the results produced by modelling data of dose response studies, classical nutrition studies and bioavailability studies and taking into account the risks of inadequate intake. Finally, a process decision tree will be created for use when deriving micronutrient reference values. The decision tree will interact with the information collated on the consumer role and policy aspects. Further information sources on individual micronutrient specific biological functions will be taken into account.